WEEDS OF NATIONAL SIGNIFICANCE

BRIDAL CREEPER

(*Asparagus asparagoides*)

Strategic Plan

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Supporting information about the National Weeds Strategy, Weeds of National Significance and progress to date may be found at www.weeds.org.au where links and downloads provide contact details for all species, their management committees and copies of the strategy.

This strategy was developed under the leadership of the Animal and Plant Control Commission of South Australia and the CRC for Weed Management Systems with full cooperation of all the States, Territories and Commonwealth of Australia. Acknowledgments are given in Appendix 1.

Comments and constructive criticism are welcomed as an aid to improving the process and future revisions of this strategy.

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EXECUTIVE SUMMARY

Bridal creeper, *Asparagus asparagoides*, is a South African vine that smothers native plants in many areas of southern Australia. It also forms a thick mat of underground tubers, which impedes root growth of these native plants, often preventing seedling establishment. Bird dispersal of bridal creeper seed has enabled rapid spread within and between remnant native vegetation. Bridal creeper poses a major threat to biodiversity and conservation in Australia's temperate natural ecosystems. It is widespread in Western Australia, South Australia and Victoria. It is also spreading in New South Wales and Tasmania. Unless effective and efficient management is implemented and maintained, rare or threatened plant species are at risk of extinction, and the Aboriginal, tourism and recreational uses of native vegetation will significantly decline. Significant progress has been made on control techniques for bridal creeper, including the use of herbicides and biological control. There is a strong need to implement these techniques in a coordinated and sustained manner on a large scale against the weed.

This document is a strategic plan to contain the spread and minimise the impacts of bridal creeper in Australia. Cooperation, commitment and funding are sought from private and government stakeholders at the local, regional, State/Territory and Commonwealth levels to tackle this weed.

The following vision underpins the strategy:

Bridal creeper is managed effectively to stop further spread and to reduce its impacts on Australia's natural assets.

The strategy has three main outcomes:

1 Commit and coordinate

- Co-ordinate bridal creeper management at national, state and regional levels
- Enable the community to recognise bridal creeper and the threats its poses to natural assets
- Establish long-term community and government commitment to fund and implement actions listed in the strategy

2 Eradicate and prevent spread

- Prohibit cultivation, distribution and sale of the plant across southern Australia
- Map bridal creeper infestations
- Identify and prioritise natural assets for protection from bridal creeper
- Develop and implement regional containment strategies
- Contain other, newly-emerging asparagus weeds

3 Reduce existing impacts

- Gain land manager adoption of the most effective and appropriate management practices for bridal creeper infestations (including rehabilitation), based on current knowledge
- Distribute biocontrol agents to regions where eradication of bridal creeper is not technically feasible
- Refine and promote best management practices for bridal creeper infestations where biocontrol agents are established.

The key components required to ensure that this strategy is implemented at the ground level are the formation of steering committees at the regional, State/Territory and national levels, and the employment of a project officer to manage and report on the progress of the strategy. This strategy is to be reviewed in five years.

THE CHALLENGE

Bridal creeper was brought to Australia from South Africa as a garden plant, but has escaped and become a major weed of bushland in southern Australia, including South Australia, Western Australia, Victoria, and parts of New South Wales and Tasmania. It has the potential for further spread and increased density in all southern states. Bridal creeper invades undisturbed habitats and smothers native plants, including seedlings of trees and shrubs. It is a major threat to most low shrubs and groundcover plants in mallee, dry sclerophyll forest and heath vegetation; in particular, it threatens a wide range of herbs, lilies and orchids. It is the most important weed threat to biodiversity in South Australia and south-west Western Australia.

Although well-controlled by grazing and cultivation in farming systems, bridal creeper is a particularly difficult weed to control in natural ecosystems. Currently, the only effective control is the careful use of two herbicides, glyphosate and metsulfuron-methyl. It is laborious and often ineffectual to control by physical means (eg. hand pulling), as it readily re-grows from underground rhizomes.

Biological control agents, including a leaf hopper and a rust, have been introduced but their long-term effectiveness is not yet known.

In Western Australia, South Australia and parts of Victoria there is substantial community concern about the spread and impacts of bridal creeper in native vegetation. However, the scale of the problem (ie. hectares infested), difficulty of control, and the need for a coordinated, funded, long-term control effort have all been disincentives in developing and implementing regional control programs. Conversely, in Tasmania and large parts of New South Wales bridal creeper is still eradicable with sustained effort. The challenge in these areas is educating the community of the impending threat and motivating them to take early action.

This document seeks to inform and motivate communities and governments to limit future spread of bridal creeper and to manage existing infestations to reduce their impacts. It provides a strategic basis to tackling one of Australia's weeds of national significance.

A dense bridal creeper infestation

1 BACKGROUND

1.1 The biology of bridal creeper

Bridal creeper is a member of the asparagus family (Asparagaceae). Its scientific name in most common use at present in Australia is *Asparagus asparagoides* (L.) W. Wight. However, it is alternately called *Myrsiphyllum asparagoides* (L.) Willd. by some botanists, and has also been known as *Asparagus medeoloides* Thunb.. Different common names include florists' smilax (not to be confused with the native plant genus *Smilax*, which is unrelated), or bridal veil (a name used mainly for *Asparagus declinatus* in SA). Bridal creeper has annual, climbing shoot growth from a perennial root system consisting of rhizomes and tubers. It produces berries, which are eaten by birds, enabling dispersal over long distances. Bridal creeper tolerates a wide range of soil and climatic conditions.

Life cycle and description

The life cycle of bridal creeper is shown in Figure 1. Seeds germinate in autumn and winter in leaf litter and at soil depths of up to 10 cm. Most buried seed germinates and the remainder rot within two years. However, seeds on the soil surface may be viable for at least three years. Compared to other weeds, bridal creeper has a short-lived seedbank.

Seedlings produce at least one tuber in their first year. Each year, new shoots emerge in autumn from the perennial root system. The root system eventually grows into an extensive "mat" of branching rhizomes and numerous fleshy tubers. This mat, 5-10 cm below the soil surface and up to 10 cm thick, actually makes up most of the biomass of bridal creeper plants. The tubers provide water, energy and nutrient reserves to enable the plant to survive over summer, and allow rapid shoot growth in autumn. The tubers also provide a physical barrier that also outcompetes other vegetation for space. The rhizomes have numerous shoot buds along their length, but most do not grow into shoots each autumn. Rather, they provide a ‘buffer’ against adverse events, growing when existing shoots die prematurely (e.g., due to cultivation, fire, hand-pulling or knockdown herbicides). This ‘bud bank’ allows bridal creeper to persist for decades, compensating for the weed’s short-lived seedbank.

Shoots of bridal creeper typically emerge from the soil in autumn, but earlier emergence can occur in years of high summer rainfall. The shoots produce shiny green 'leaves' (cladodes), 4-30 mm wide and 10-70 mm long, which occur along the length of the wiry green stems. The shoots scramble across the ground and climb shrubs and trees. The stems are twisting, grow up to 3 m in length and branch extensively. The climbing habit enables establishment even in dense vegetation.

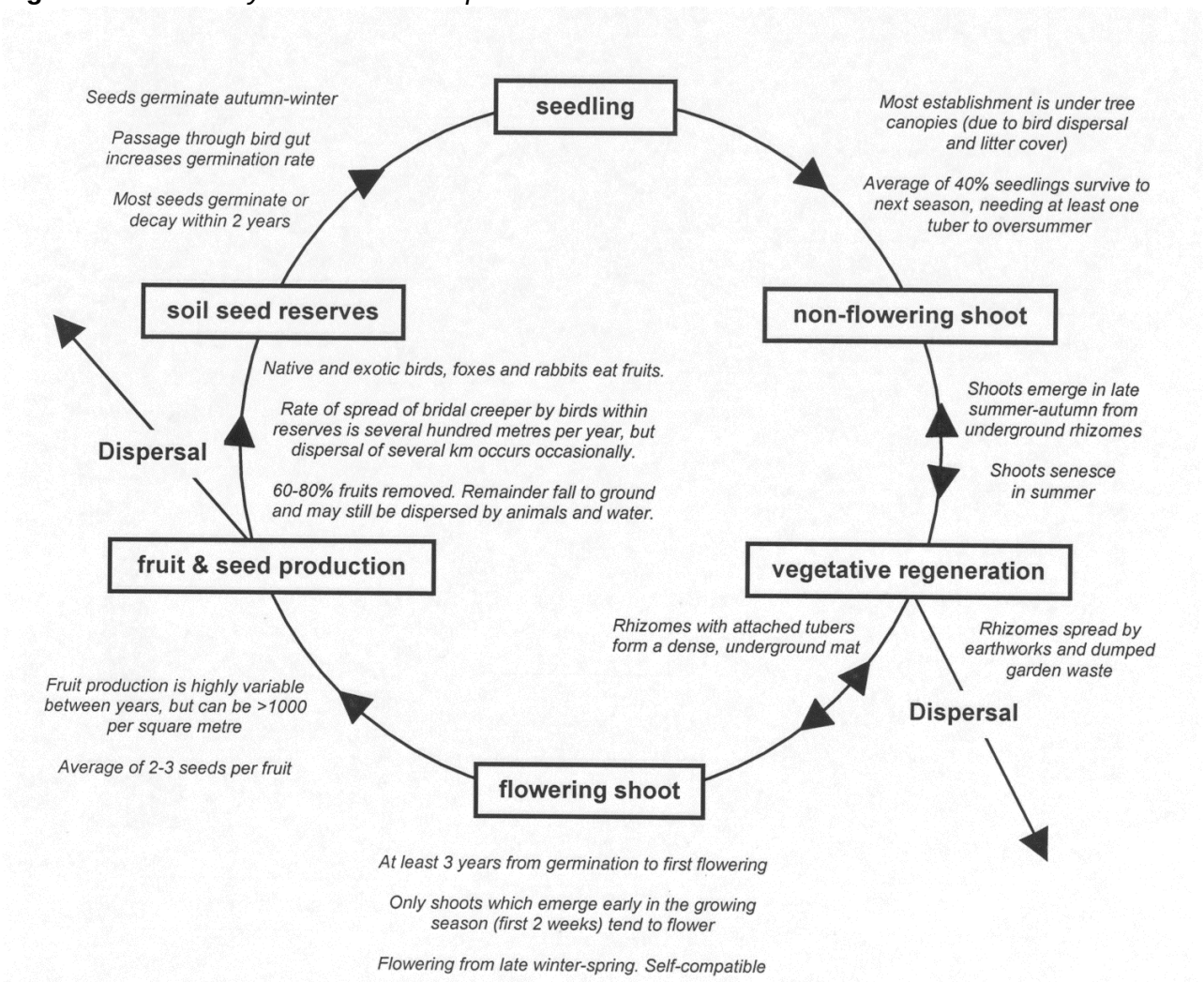
Bridal creeper plants take at least three years to reach flowering size. Only shoots which emerge in the first few weeks of the growing season flower. Flowers appear in August and September. They are white, fragrant, 6-petalled and 5-8 mm in diameter, and occur along the length of the shoots. Flowers are visited by bees and can self-pollinate. Green berries are formed, 5-10 mm in diameter. These contain an average of 2-3 black seeds, and turn red in late spring-early summer. Over 1000 berries per square metre may be produced.

There can be large differences in fruit production between years and sites. Early autumn rains allow a longer growing season, which favours high fruit production. Fruit set is significantly greater where shoots are able to grow vertically, by twining up shrubs and trees. Fruit production is lower where bridal creeper is heavily shaded, suffers water stress (e.g., shallow soils in full sun), or where there is a high level of competition between shoots (i.e., older, dense infestations). On Kangaroo Island, South Australia, many of the older populations of bridal creeper (>20 years old) have been observed to have poor fruit production.

Birds play a critical role in helping to spread bridal creeper, by feeding on the berries and later excreting the seeds at perch sites. This accounts for the spread of bridal creeper along roadsides and into native vegetation. Foxes and rabbits are also known to eat berries. Most bird excretion of seeds is within 100 m of the seed source, and average spread of bridal creeper has been estimated at around 200 m per year within reserves.

However, there are occasional dispersal events of several kilometres, especially where native vegetation is fragmented.
Bridal creeper leaves turn yellow and fall, and stems die back in late spring-early summer, as temperatures rise and soils become dry. Fruiting shoots tend to die back last. The above ground biomass breaks down, such that a severe bridal creeper infestation may largely escape notice during the summer. Some shoots may persist or new shoots may emerge in areas that receive reliable summer rainfall.

Figure 1 *Life cycle of bridal creeper in southern Australia*



Flowering shoots of bridal creeper
Photo: CRC for Weed Management Systems

Berries of bridal creeper
Photo: Animal and Plant Control

Habitat

The native range of bridal creeper is southern Africa, from the Cape to Tanzania. In South Africa, it is widely distributed and occurs in the three main rainfall zones (winter, summer and even rainfall). In Australia, it mainly occurs in the winter rainfall zones of southern Australia, but does occur in zones with even rainfall in coastal NSW. It is frost tolerant and the perennial root system enables it to survive summer drought. The predicted distribution of *A. asparagoides* in Australia is shown in Figure 2.

Bridal creeper invades a wide range of natural habitats in Australia including coastal vegetation, wet and dry sclerophyll forests, heathlands, mallee shrublands, and adjacent to creeks and rivers. It also grows well in citrus orchards and pine plantations.

Bridal creeper is typically found under tree canopies. This is largely due to bird movements, but also reflects greater seedling establishment in leaf litter and better growth in shaded or part-shaded situations. Bridal creeper can grow in most soils and can tolerate a wide range of soil pH and moderate salinity. However, it is particularly vigorous in alkaline, sandy soils. It thrives in nutrient-enhanced soils in microhabitats such as drainage lines. Roadsides adjacent to farms are particularly favourable sites, with increased nutrient levels from fertilised paddocks, increased moisture with runoff from the road, and no grazing.

Related species in Australia

The only species of *Asparagus* native to Australia is *A. racemosus*, occurring in northern Australia (Queensland, WA and NT). It is relatively uncommon, but may form tangled masses along watercourses. Its distribution does not overlap with bridal creeper, and it is distinguished by its narrow 'leaves' up to 1 mm wide and flowers in long racemes. It is not considered a weed.

The commercially grown, edible asparagus is *Asparagus officinalis*. Whilst it has escaped cultivation in most states, it is not currently considered a significant weed threat.

Closely-related species causing significant weed problems in Australia include:

- *Asparagus africanus* (asparagus fern, synonym *Protoasparagus africanus*)
- *A. declinatus* (bridal veil, syn. *A. crispus, Myrsiphyllum declinatum*)
- *A. densiflorus* (ground asparagus, syn. *Protoasparagus densiflorus, P. aethiopicus*)
- *A. plumosus* (climbing asparagus fern, syn. *A. setaceus., P. plumosus)*
- *A. scandens* (asparagus fern, syn. *M. scandens*), and

These species also occur as escaped garden plants in habitats similar to those invaded by bridal creeper. *A. declinatus* is an increasingly serious weed in SA (Fleurieu Peninsula, Kangaroo Island, and lower Eyre and Yorke Peninsulas,) and several small infestations also occur in WA. *A. scandens* is a particular concern in Victoria (e.g., Phillip Island) and the central coast of NSW. It is the worst *Asparagus* weed in New Zealand. *A. plumosus* and *A. densiflorus* are weeds of coastal vegetation in NSW and Queensland, and are declared noxious for Lord Howe Island and parts of New South Wales. The herbicide control methods outlined below for bridal creeper may be effective against other weedy *Asparagus*. However, the two biological control agents released to date (the rust and bridal creeper leafhopper) are specific to *A. asparagoides*.

1.2 History of spread

The likely source of origin of bridal creeper in Australia is the southern Western Cape Province of South Africa.

First recorded in Australia in 1857 in a nursery catalogue, by the 1870s bridal creeper was a common garden plant. Its foliage was used in floral arrangements, particularly in wedding bouquets. Within 50 years of introduction, bridal creeper had become naturalised in many areas across most of southern Australia. Bridal creeper is now widely distributed through south-west Western Australia, southern South Australia, central and eastern Victoria, the Sydney basin and Hunter region in New South Wales and Lord Howe Island (Figure 3). It has only recently become established in Tasmania, with infestations estimated to total 20 hectares. Bridal creeper is also a weed in New Zealand.

Regions in Australia where bridal creeper still has much potential for further spread include:

- central-northern and far south-eastern coasts of Western Australia;
- far south-western coast and northern agricultural districts of South Australia;
- northern and south-western Victoria;
- central and southern New South Wales;
- south-east Queensland; and
- northern and eastern Tasmania

Even in regions where bridal creeper is widely distributed, there are still great threats from continued "in-filling" to saturate the areas that are not currently occupied.

Figure 2 *Predicted distribution of bridal creeper in Australia. Darker shading indicates a greater climate match. (Prediction done using CLIMATE software using the closest Euclidian distance method. Matched from the native range in South Africa.)*

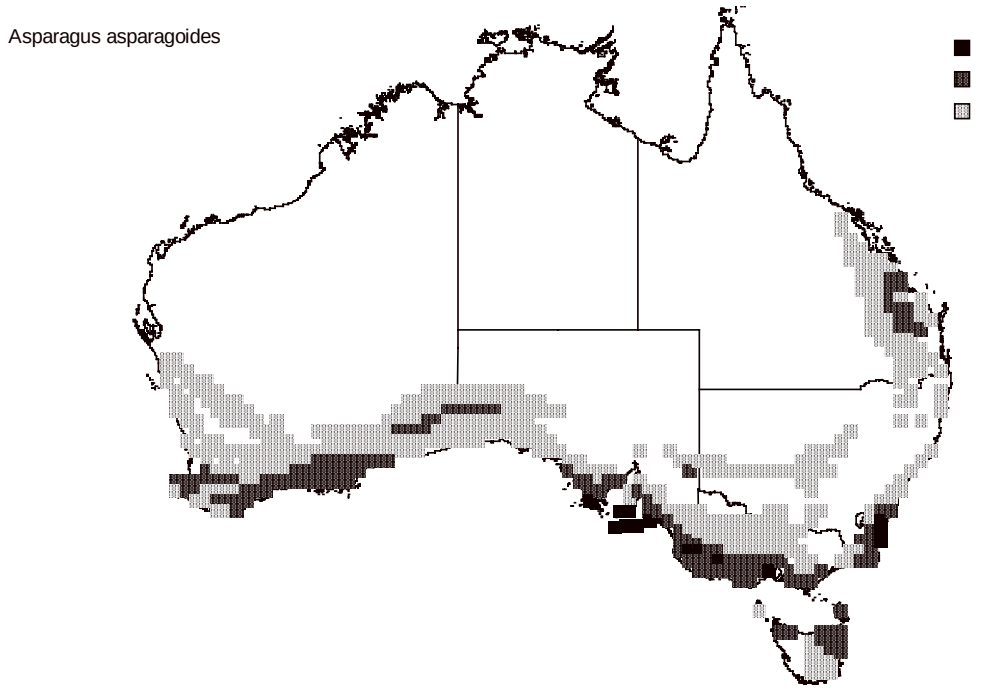
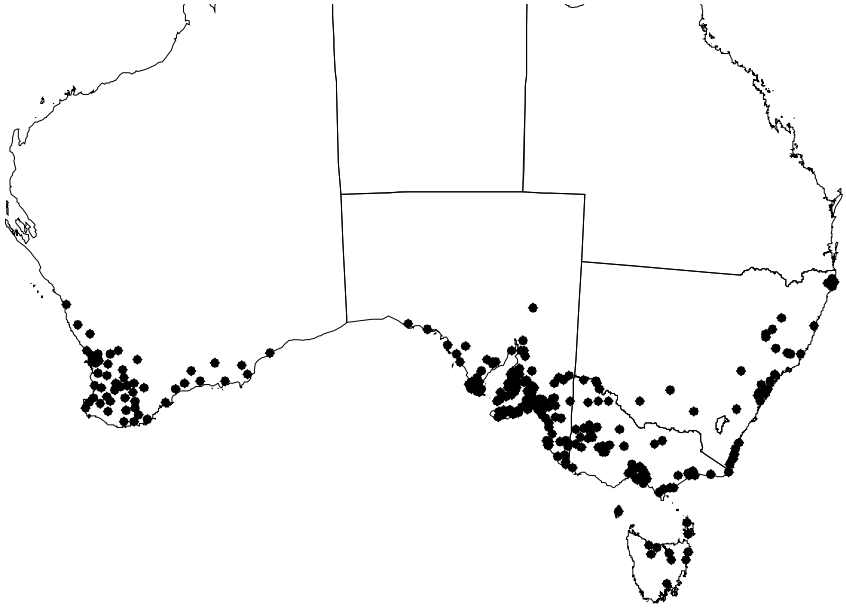


Figure 3 *Current distribution of bridal creeper in Australia. Data from various references listed in section 5, and a national questionnaire (see section 1.8).*



1.3 A weed of national significance

Bridal creeper threatens native vegetation by strongly competing for space, light, water and nutrients. Its shoots form a dense canopy that shades indigenous shrubs, herbs and seedlings. The tuber mat forms a thick barrier just below the soil surface which limits the access of other plants to soil moisture and nutrients. This barrier makes it difficult for native seedlings to establish. Bridal creeper reduces the number and density of indigenous plants, in turn affecting animals, which depend on these plants. Some rare species, such as orchids and *Pimelea spicata*, are threatened with extinction because of competition from bridal creeper.

Bridal creeper poses a major threat to biodiversity and conservation in Australia's temperate natural ecosystems. The potential loss of indigenous species is difficult to quantify in economic terms. Managers of conservation reserves, however, face considerable direct costs in trying to manage infestations.

Economic losses to primary industries are also significant. Bridal creeper can cause shading of citrus and avocado trees and interfere with fruit picking. This is a particular problem in the irrigation areas of South Australia, Victoria and southern New South Wales. In forestry systems bridal creeper can cause direct economic losses by smothering planted tree seedlings.

1.4 Noxious weed status

Bridal creeper is a declared noxious weed in South Australia, New South Wales and Tasmania.

In South Australia, bridal creeper is proclaimed statewide; it is a legal requirement for landholders to control it on their properties and adjacent roadsides, and it is not to be sold or transported.

Similarly in Tasmania, bridal creeper cannot be propagated or sold, and existing plants must be eradicated. A State Bridal Creeper Weed Management Plan is being developed under the Weed Management Act 1999.

In New South Wales, bridal creeper is listed as a noxious weed for most local government areas in northern and western Sydney (including Campbelltown, Hornsby, Hunters Hill, Ku-ring-gai, Lane Cove, Parramatta, Ryde and Willoughby Councils). In these local government areas, it must not be sold, propagated, or knowingly distributed and must be prevented from spreading to an adjoining property.

Bridal creeper is currently not declared in Victoria or Western Australia, where it is a weed of major concern.

1.5 Control methods

Features which have made bridal creeper a difficult weed to control include:

- tuber reserves which provide resources for growth and a buffer against adverse seasons;

- both sexual and vegetative reproduction;
- effective, long-distance dispersal;
- a wide germination range;
- an ability to invade "undisturbed" sites; and
- no predators (however this is changing with the release of biocontrol agents).

Weaknesses of bridal creeper's biology include:

- a short-lived seedbank;
- seed production only occurring on early-emerging stems; and
- a reduction in seed output in old infestations.

Preventing spread

Prevention is the most cost-effective means of weed control. It is vital to keep currently uninfested areas free of bridal creeper. Legislation prevents the sale of bridal creeper in a number of areas. However, this needs to be backed up with community education. Nurseries need to be aware that the plant is a current or potential problem, and of safe alternatives that could be sold. Local markets and gardener-to-gardener distribution is more problematic, but also needs to be addressed through an awareness campaign. Gardeners must be discouraged from planting bridal creeper, and be encouraged to replace existing plants, safely disposing of garden waste.

Where bridal creeper is present in a region, an effective containment program around existing infestations should limit its further spread. A buffer zone needs to be established, within and beyond which a high degree of bridal creeper control (methods detailed below) is maintained.

Mapping is important to determine:

- what area of bridal creeper is present in a region;
- where infestations are located (particularly in relation to areas of significant native vegetation);
- which infestations are eradicable;
- which infestations are likely to be major seed sources; and
- where buffer/control zones should be located.

Roadside surveys (e.g., stopping every few hundred metres) have been done previously to indicate infested and uninfested areas on a regional scale. However, more detailed mapping to include private and public lands is needed to establish buffer zones. GPS should be used for accurate mapping and sharing of data. Data may have been collected by various government agencies and community groups. These data should be collated prior to new surveys. Topographic maps and aerial photos are useful for planning surveys.

Focusing on high-risk sites for bridal creeper can speed up mapping. New infestations of bridal creeper are often associated with the tallest trees, reflecting preferred bird perching sites. When searching for bridal creeper, check tree corridors (including fencelines, roadsides and watercourses), and taller trees on the edges of native vegetation.

Buffer zones for bridal creeper should be 500 m around the edge of an infestation. The rate of spread of bridal creeper due to seed dispersal by native silvereyes (*Zosterops lateralis*) has been estimated as 225 m per year, but this rate will be greater in regions with fragmented habitats (e.g., patches of native vegetation separated by paddocks). The majority of bridal creeper seeds will be dispersed within 100 m of parent plants, but there can be rare dispersal events of several kilometres.

Control within the buffer zone should focus on limiting further spread. The conventional approach is to concentrate on the small, outlying patches at the edges of an infestation, working back towards the core. However, an alternative idea is that the larger, climbing infestations produce the most seed and are thus most attractive to birds. Thus a combined approach of eradication of outliers and limiting seed production in large patches may be best, but research is needed to confirm this.

Fox baiting may be useful to limit long-distance dispersal. By contrast, bird control is difficult and inappropriate for native species. Earthworks such as roadside grading can spread rhizomes of bridal creeper, starting new infestations. Council and private contractors need to be aware of the risks of spreading this and other weeds and adopt appropriate hygiene practices.

Controlling infestations

To date, herbicides have been the most effective means of bridal creeper control. Recent releases of biological control agents offer good prospects of improved control, particularly where herbicide use is not practical. Physical removal, grazing and fire may be useful in certain circumstances.

Records of control activities and their success (e.g., photopoints, maps, techniques) need to be kept to chart progress.

Herbicides

Bridal creeper can be controlled with two herbicides that, with correct use, can be applied safely and with low environmental impact. The two herbicides, metsulfuron methyl (e.g., Brush-off®) and glyphosate (e.g., Roundup®), have differing advantages and disadvantages.

Bridal creeper is susceptible to very low rates of metsulfuron methyl, allowing effective control with little effect on grasses and established trees and shrubs. However, metsulfuron methyl should be applied carefully with a hand sprayer to minimise contact with other plants, especially native herbs, or soil. The volume and speed of application used must avoid run-off from the leaves. Research has found an application rate of 3 grams of active ingredient per 100 litres of water was sufficient for control of bridal creeper (this is equivalent to 5 g of product containing 600 g/kg metsulfuron methyl). Metsulfuron methyl can remain active in alkaline soils for many months. Its repeated use at sites with such soils raises concern for long-term effects on native vegetation. It should be cautiously used where native herbs and seedlings of shrubs and trees are regenerating following bridal creeper control.

Glyphosate is generally not persistent in soils, but is active against more types of plants than metsulfuron methyl. Off-target impacts have been a concern where this herbicide has not been applied carefully. Glyphosate is best applied with a hand-sprayer, but can be wiped directly onto bridal creeper leaves for greater selectivity. Wiping is time-consuming for large infestations, but may be useful for follow-up control or new infestations.

Only herbicides that are registered for bridal creeper control in that state should be used. Check with the relevant state authorities prior to use. The metsulfuron methyl-based herbicide Brushoff® is registered for bridal creeper control in all states. The glyphosate-based herbicide Roundup® is registered for general control of "perennial weeds" in all States. NSW has issued a permit for the use of various glyphosate products for bridal creeper control in native vegetation. A permit for glyphosate and metsulfuron-methyl products is current in Tasmania for non-crop situations. The same permit applies to Western Australia for metsulfuron-methyl products only.

Bridal creeper management on Kangaroo Island, SA

A coordinated project to control bridal creeper on Kangaroo Island has been the focus of funding (totalling $102 000 since 1996) from the Native Vegetation Council, Natural Heritage Trust and Landcare funding. The Bridal Creeper Control Committee and National Parks and Wildlife South Australia staff have managed this program.

Mapping and identifying control areas was an integral part of the strategy. The grey Currawong was identified as the main vector of bridal creeper spread on Kangaroo Island, with a home range of 1.5 km. The weed was also observed to be slow moving in the Kangaroo Island environment due to low fruiting and flowering levels. The result has been a targeted control program protecting significant roadside plant communities, containment of the western and south western spread of bridal creeper, trial spray programs targeting bridal veil and the subdivision of existing bridal creeper populations into isolated sectors by concentrating on corridors used by birds. The community support for this program has been high and the project is a model for other regions to follow.

Biological Control

In its native South Africa bridal creeper is not weedy. It is in fact an uncommon plant that never grows as vigorously as it does in Australia, but is kept in check by its own specific natural enemies, both insects and fungi. Two biological control agents have been released to date for bridal creeper in Australia, the bridal creeper leafhopper (*Zygina* sp.) and a rust fungus, *Puccinia myrsiphylli*. These agents were selected and

developed by the CSIRO and CRC for Weed Management Systems, with funding from State and Commonwealth governments. All biocontrol agents must pass strict host range studies before being given permission by the Australian Quarantine and Inspection Service and Environment Australia for release.

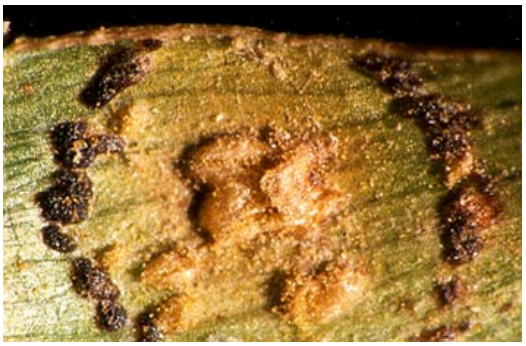
The bridal creeper leafhopper was released at over 200 sites throughout southern Australia since 1999. Each female lays about 200 eggs over a six-week period, and the insects have multiple generations a year. Hence the bridal creeper leafhopper has the ability to build in numbers quite rapidly, although predation of eggs by a native parasitoid has been observed. Both the adults and immature stages feed on the foliage of the weed, causing the leaves to turn silver. If damage is severe enough, leaf fall occurs. The net result is less photosynthate available for growth, reproduction and tuber storage. Attacked plants in South Africa produce fewer flowers and fruits than unattacked ones. The bridal creeper leafhopper is specific to bridal creeper and has successfully oversummered at release sites. Rearing is straightforward, and schools and community groups have received training to produce bridal creeper leafhoppers for additional local releases.

The bridal creeper rust was officially released in 2000, and localised spread has already been observed at release sites. The fungus attacks both leaves and stems, where it produces pustules that are surrounded by yellowing tissue. The fungus causes nutrients to be diverted away from healthy plant tissue, and thus can have a major impact on the level of reserves that would normally be stored in the tubers. Severe attack will also cause leaves to senesce prematurely and drop. The fungus has many generations a year, and produces large amounts of wind-dispersed spores. It should spread within and between bridal creeper infestations efficiently, but spread will be faster with more regional releases of the rust.

Several other biocontrol agents are currently being studied in South Africa and in quarantine in Australia. They are a shoot feeding beetle, growth tip galling fly and a fruit-feeding moth. Reductions in the density of bridal creeper populations by the biocontrol agents are likely to take many years, due to the huge reserves stored in the tuber biomass that supports plant growth in Australia. In the meantime, the spread of bridal creeper must be prevented by using various other means of control.

Adult bridal creeper leafhopper
Photo: University of Adelaide

Bridal creeper leafhopper feeding damage
Photo: CRC for Weed Management Systems



Other control methods

Simple physical removal of bridal creeper is not effective unless all of the rhizomes are dug up and destroyed. This may be possible for new, small infestations or as a follow-up after several years of herbicidal control of a larger infestation. However, digging is too time consuming and too disturbing to soil in native vegetation to be used as a primary control measure for large infestations. Slashing the stems and foliage may prevent fruit production and slowly deplete root reserves, but will not eradicate an infestation.

Fire and herbicides may be integrated to manage larger infestations. Fires in late summer and early autumn can remove all understorey vegetation, thereby improving access for later spraying of bridal creeper. In winter-rainfall areas, bridal creeper often emerges before the first rains in autumn so that herbicides may be applied prior to post-fire regeneration of native vegetation. Metsulfuron methyl must be used carefully after fire as some indigenous seedlings may be killed as a result of its greater persistence than glyphosate in soil, especially in alkaline soils which become even more alkaline after a fire. In addition to assisting herbicide application, fire may be beneficial in destroying bridal creeper seed and the tuber mat. The tuber mat is persistent for many years following herbicide spraying, and an investigation is needed into the use of fire to remove this barrier to regeneration of native plants. Care must be used with fire, and any intentional burns must have permission of appropriate fire management authorities and native vegetation bodies (e.g., Native Vegetation Council in SA). However, any accidental fires must be seen as an opportunity for further weed control.

Grazing can provide some control. Tamar wallabies on Garden Island in Western Australia have successfully kept bridal creeper at low levels. Bridal creeper is readily eaten by sheep, and does not persist in grazed paddocks. Sheep grazing may be an option to limit fruit production under trees in remnant vegetation, woodlots and shelterbelts. However, sheep grazing can significantly damage native understory plants and tree seedlings in native vegetation, and it is not appropriate for conservation reserves.

Revegetation with indigenous plants, whether by natural regeneration or planting, is the final step in a weed management program in natural areas. This tactic usually limits reinvasion of the original weed and new weeds. However, bridal creeper is a weed that readily invades dense vegetation, so revegetation is not a useful control measure for this weed.

Control in horticulture

Bridal creeper can infest citrus and avocado orchards, with vigorous growth and a long growing season due to fertilisers and irrigation. It is difficult to spray bridal creeper entwined in tree foliage. However, pruning lower limbs to provide access underneath trees, a practice termed "skirting", enables spot-spraying of bridal creeper with glyphosate. Skirting also provides other benefits, such as enhanced snail and weed control, use of under-tree irrigation, frost-protection and increased fruit size.

1.6 Socioeconomic factors affecting management decisions

There are no economic data on the weed's impact, but there are considerable economic costs for proper and careful herbicide treatment of the weed. For example, a bridal creeper spray program on Kangaroo Island

has had an annual cost of approximately $30,000. Socially, some landowners and managers are reluctant to use herbicides, and others lack finance, equipment, training, and/or physical ability to do so.

In citrus orchards, control of bridal creeper can be a significant financial burden; particularly where low commodity prices mean that farm input costs need to be minimised.

When treating bridal creeper in native vegetation, it is essential to consider the weed's management in light of other management issues (e.g. fire, vertebrate pest control, and public access) so that they can be integrated to get the best results.

Groups regenerating bushland should be made aware of the invasive potential of bridal creeper, particularly given its biological features such as its dispersal by birds, its extensive root system and the potential for rhizomes to spread the weed, if not eradicated completely.

Landholders generally do not receive direct benefits from bridal creeper control, and consequently the cost of control and time taken are disincentives to control.

1.7 Principles underpinning the plan

This plan is based on the recognition and acceptance of the four principles of the National Weeds Strategy:

1. Weed management is an essential and integral part of the sustainable management of natural resources and the environment, and requires an integrated, multidisciplinary approach.

2. Prevention and early intervention are the most cost-effective techniques that can be deployed against weeds.

3. Successful weed management requires a coordinated national approach which involves all levels of government in establishing appropriate legislative, educational and coordination frameworks in partnership with industry, landholders and community.

4. The primary responsibility for weed management rests with landholders/land managers but collective action is necessary where the problem transcends the capacity of the individual landholder/land manager to address it adequately.

1.8 Process followed

The main features of this strategic plan have been developed at meetings and from publications on bridal creeper during the past decade. The available information on bridal creeper was initially assembled into a draft strategy by a small steering committee led by the CRC Weed Management Systems, and emailed to a wide group of stakeholders for review and discussion. A workshop was then held in Adelaide in March 2000 with attendees from South Australia, Victoria, the ACT and Tasmania, and with participation by video link from Western Australia. The strategy was then progressed to its present form by the Animal and Plant Control Commission of South Australia.

A questionnaire was also sent to government agencies and community groups throughout southern Australia to gain "on-ground" input into the strategy. Close to 90 replies were received, providing data on the current distribution of bridal creeper, existing control and survey techniques, information needs, and desired actions at the local, state and national levels. A brief summary follows:

A draft strategy for public comment was circulated in October-November 2000. Copies were sent to relevant State/Territory and Local Government agencies and the questionnaire respondents. Twenty-four comments were received and the final draft of the strategy was completed in December 2000.

The National Bridal Creeper Questionnaire

Eighty-seven individual replies were received, 60% from SA, 25% from NSW, and 8% each from Vic and WA. Reported locations of bridal creeper have been mapped in Figure 3. Respondents were from community conservation groups, noxious weed agencies, local government and national parks and wildlife services.

Approximately 200 conservation reserves were reported to contain bridal creeper, with 20% of these having few, minor infestations and 15% where bridal creeper was very widespread. An additional 25 conservation reserves were reported to be presently free of bridal creeper. It should be noted that these figures represent only a sample of the total number of conservation reserves across southern Australia, and the real bridal creeper situation would be even more serious.

Glyphosate was used for control by 31 survey respondents, whereas 19 used metsulfuron-methyl.

The priority information needs were best practice control techniques, availability of biological control and potential areas at risk of invasion by bridal creeper.

Priority actions at the local level were mapping of occurrence and density, control of infestations and a raising of general community awareness about bridal creeper. At the state level the priorities were biological control research, awareness of the current and potential impacts and funding for on-ground management of bridal creeper. At the national level biological control and funding for control were again top priorities, as well as research into integrated management.

Detailed results from this questionnaire can be obtained from the Animal and Plant Control Commission of SA.

A draft strategy for public comment was circulated in October-November 2000. Copies were sent to relevant State/Territory and Local Government agencies and the questionnaire respondents. Twenty-four comments were received and the final draft of the strategy was completed in December 2000.

1.9 Relevance to other strategies

This plan has been established to provide a framework for coordinated management of bridal creeper across the country. The strategy has links to other national and state resource plans and to groups already involved in weed management at regional and local levels as listed in Table 1.

Table 1 *Linkages of the bridal creeper strategy to other strategies and plans*

Scope/ Scale	Natural Resource Management	Pest Management	Bridal Creeper Management
National	National Strategy for the Conservation of Australia's Biodiversity National Strategy for Resource Management National Strategy for Ecologically Sustainable Development	National Weeds Strategy	Weeds of National Significance - Bridal Creeper Strategic Plan
State/ Territory	State/Territory Biodiversity/Nature Conservation Strategies State/Territory Revegetation/Natural Resource Management Strategies	Weed Strategy for South Australia Victorian Weed Strategy Environmental Weed Directions Plan for Victoria Weed Plan for Western Australia (Draft) NSW Weed Strategy Queensland Weed Strategy WeedPlan, TAS ACT Weeds Strategy	Tasmanian Management Strategy: Bridal Creeper
Regional/ Catchment	Regional Natural Resource Management Plans Regional Vegetation Plans Regional Local Environment Plans Regional Biodiversity Strategies Catchment Management Strategies Regional Revegetation Strategies	Regional/Catchment Weed Plans (NSW, Victoria and Tasmania) Regional Pest Management Strategies (QLD) Strategic Plans of Noxious Weed Authorities Parks and Wildlife District Weed Management Plans (NSW and Victoria)	Strategic Control of Bridal Creeper and Bridal Veil on Kangaroo Island, SA Asparagus Weeds Steering Committee (Southern Hills region, SA): Investment Strategy Animal and Plant Control Boards (SA) Bridal Creeper Policies
Local/ Property	Landcare Plans Property Management Plans Park and Reserve Management Plans	Local Weed Plans (Noxious Weed Authorities, Local Government) Local Government Pest Management Plans Property Pest Management Plans	Tasmanian Bridal Creeper Working Group's Site Management Plans

2 STRATEGIC PLAN

VISION

Bridal creeper is managed effectively to stop further spread and to reduce its impacts on Australia's natural assets.

2.1 Commit and Coordinate

Desired outcome

The community and governments recognise bridal creeper as a major environmental threat and are committed to its management.

Background

Bridal creeper infestations threaten a large area of southern Australia and therefore management of this weed requires a coordinated, strategic approach at local, regional, state and national scales. The establishment of regional, state and national steering committees (or the use of existing weed committees) will facilitate this coordination. There are existing and developing planning processes from local to national scale for weeds and natural resource management in general. These processes involve wide community consultation and offer a means of expanding community commitment to bridal creeper and incorporating its management into a wider framework.

Reducing the impact of bridal creeper is an integral part of management of natural vegetation, including maintaining biodiversity, tourism and Aboriginal land values. This is well recognised by weed and native vegetation managers at the community level (i.e., local government, national parks officers, voluntary "friends" groups and landholders). However, "on-ground" actions are constrained due to a lack of wider community concern and subsequently poor funding of management programs.

There is a strong need to raise general awareness of the identity of and threats posed by bridal creeper, both in areas where it currently exists and in regions to which it could spread. This includes targeting urban and rural sectors, which both indirectly benefit from healthy and diverse natural ecosystems in the Australian landscape. A raising of general community concerns and an identification of key stakeholders will foster responsibility and commitment to maximise the availability of funds and resources for actions against the weed. Funding must be long-term, until substantial gains against bridal creeper have been measured. Reporting on progress under this strategy will be vital to demonstrate these gains.

Objective 2.1.1 Co-ordinate bridal creeper management at national, state and regional levels.

Strategy	Actions	Responsibility	Priority
Manage the implementation of the bridal creeper strategy	Establish and maintain a national steering committee	APCC convenor, with representatives from WA, SA, NSW, VIC and TAS.	1
	Establish and maintain state and regional steering committees	State/Territory govt. agencies, Local government, community groups	1
	Seek funding to employ a national project officer to service and coordinate steering committees and their actions	National BC Committee	1
	Employ project officer	Managed by APCC	1
	Assess and prioritise project funding proposals (e.g., on-ground, research, extension) on an outcomes basis	National/State/Regional BC committees	1
Monitor implementation of the bridal creeper strategy	Collate strategic plan milestones at respective levels	Project Officer, National/State/Regional BC committees	1
	Report on progress against milestones annually to NWSEC and stakeholders at national, state and regional levels	Project Officer, National/State/Regional BC committees	1
	Review the success of the strategy at five years from commencement	National BC committee	1
Coordinate communication about the strategy	To ensure awareness of the plan, which identifies opportunities and achievements	Project Officer, Commonwealth, State/Territory govt. agencies, National/State/Regional BC committees	1
	Ensure linkages with other plans to maximise awareness and coordination of actions	Project Officer, Commonwealth, State/Territory govt. agencies, National/State/Regional BC committees	2

Objective 2.1.2 Enable the community to recognise bridal creeper and the threats it poses to natural assets.

Strategy	Actions	Responsibility	Priority
Implement awareness and education activities specific to the needs of different groups (e.g., general urban and rural communities, reserve managers, weed managers, landholders with native vegetation, governments, gardeners and plant sellers)	Identify key target groups for awareness and education	Project Officer, National/State/Regional BC committees	1
	Develop and implement extension and communication plans utilising the media	Project Officer, National/State/Regional BC committees, State/Territory govt. agencies, Local weed authorities	1
	Develop and distribute information pamphlets on bridal creeper identification, threats, spread and management	National BC committee, State/Territory govt. agencies, Local weed authorities	1
	Obtain, collate and promote data that illustrate the current and potential impacts of bridal creeper on biodiversity	CSIRO, Universities, State/Territory govt. agencies	2

Objective 2.1.3 Establish long-term community and government commitment to fund and implement actions listed in the strategy.

Strategy	Actions	Responsibility	Priority
Maximise the availability and use of resources for bridal creeper management	Identify stakeholders at local, regional, state and national levels	National/State/Regional BC committees	1
	Include stakeholder consultation in all project development	All stakeholders	1
	Develop projects which access all appropriate components of Commonwealth (e.g. NHT), State/Territory and local govt. funding programs	National/State/Regional BC committees	1
	Coordinate project funding applications	Project Officer, National/State/Regional BC committees	1
	Ensure that resources for "on-ground" projects are adequate and long-term to ensure desired outcomes are met (in particular for follow-up control measures)	All stakeholders	1
	Ensure reporting of progress on projects	National/State/Regional BC committees	2
	Support ongoing research in integrated weed management of bridal creeper	Commonwealth and State/Territory govt. agencies, CSIRO, universities	1
	Establish linkages and joint action with other relevant WONS strategies	Commonwealth and State/Territory govt. agencies, Project Officer	1
Maximise community involvement in management of bridal creeper	Develop incentives for participating in control programs	State/Territory govt. agencies, Local govt., Local weed authorities, Regional BC committees	1
	Determine criteria for government financial assistance versus landholder responsibility	National BC committee	2
	Establish strong links to community-based Friends of Parks and Bushcare groups	Project Officer, Regional BC committees, Local weed authorities	1
Apply for bridal creeper to be listed as a Key Threatening Process under Commonwealth environment legislation	Prepare a submission to Environment Australia which will be subjected to due process and assesssment	Environment Australia, National BC committee, Project Officer	2

2.2 Eradicate and Prevent Spread

Desired outcome

High value natural assets are protected from invasion by bridal creeper.

Background

There are areas of southern Australia that are free of bridal creeper or have sparse populations. This is particularly the case on a large scale for Tasmania, New South Wales and Queensland, but even within Western Australia, South Australia and Victoria there are such areas. With committed and sustained action, these areas can be protected from further bridal creeper spread. By preventing trade in bridal creeper for use in gardens, by mapping bridal creeper and natural assets which need protection from the weed, and by instigating strategic eradication and containment projects, the spread of bridal creeper across southern Australia can be significantly reduced.

Natural assets are defined as healthy, natural ecosystems, which may be contained within national parks and conservation reserves, or held under private ownership. There is a need to prioritise such assets for protection, considering such factors as levels

of biodiversity, area, threatened habitats and endangered species.

Mapping is an integral first step to planning an eradication and containment program. Three types of zones can then be defined:

1. *Eradication zone* - bridal creeper plants are scarce or absent, and there is a high potential for invasion and for future impacts on natural assets. Here, the focus is on eliminating infestations;
2. *Buffer zone* - there are scattered infestations of medium density, which can be actively managed in a coordinated manner amongst landholders to prevent spread into the eradication zone;
3. *Containment zone* - dense bridal creeper infestations over a wide area. Infestations may be inaccessible or not strategically important (e.g., not impacting on natural assets). Here the focus is on long-term integrated weed management, primarily led by the landholder and general community.

Defining these zones then identifies priorities for on-ground actions.

Prevention and early intervention is a key principle of the National Weeds Strategy. It is the most cost-effective approach in dealing with weeds. Hence, it is imperative to prevent the spread of "new bridal creepers" that have naturalised in discrete areas of Australia. Five species with similar weed attributes to bridal creeper are *A. africanus*, *Asparagus declinatus*, *A. densiflorus*, *A. plumosus* and *A. scandens*. Significant deleterious impacts on biodiversity in the future can be avoided by containing these weeds now. The importance of dealing with these potential weeds immediately cannot be emphasised strongly enough.

Objective 2.2.1 Prevent the sale, distribution and cultivation of bridal creeper.

Strategy	Actions	Responsibility	Priority
Prohibit cultivation, distribution and sale across Australia	Declare bridal creeper under State/Territory Acts to prohibit cultivation, distribution and sale nationally	State/Territory govt. agencies	1
	Prepare a submission to Environment Australia (301A of the EPBC Act) to regulate the control of bridal creeper, which will be subject to due process and assessment. Subject to due process declare bridal creeper nationally under the Environment Protection And Biodiversity Conservation Act 1999	National bridal creeper committee and project officer	2
	Education program to inform all nurseries of the threat of bridal creeper and its restrictions on sale	State/Territory govt. agencies, Local weed authorities, National and State Nursery Industry Associations	2
	Awareness program targeting weekend markets and street stalls	State/Territory govt. agencies, Local weed authorities	2

Objective 2.2.2 Map bridal creeper infestations.

Strategy	Actions	Responsibility	Priority
Produce maps of bridal creeper distribution at local, regional andstate levels	Develop a standard procedure for mapping bridal creeper at a local or regional scale	Project Officer , State/Territory govt. agencies, Local weed authorities, National BC Steering Committee	1
	Identify and collate existing data sources	Project Officer, State/Regional BC Committees	1

	Map current bridal creeper infestations	State/Regional BC Committees, State/Territory govt. agencies, Local weed authorities, Local government	1
	Map potential bridal creeper habitat	State/Territory govt. agencies, State BC committee, Universities	2
	Promote mapping as an integral step in regional planning	Regional and Local Authorities	2

Objective 2.2.3 Identify and prioritise natural assets for protection from bridal creeper.

Strategy	Actions	Responsibility	Priority
Identify and prioritise natural assets which need to be protected from bridal creeper	Identify and collate existing data sources of natural assets	State/Territory environment agencies	1
	Develop a set of criteria to rank natural assets	State/Territory environment agencies	1
	Map assets in relation to bridal creeper distribution	State/Regional BC Steering Committees, State and Local governments	1

Objective 2.2.4 Develop and implement regional eradication or containment strategies.

Strategy	Actions	Responsibility	Priority
Foster eradication and containment planning and implementation	Use bridal creeper and natural asset maps to identify eradication, buffer and containment zones	Regional BC Steering Committees	1
	Fund strategic regional control programs	State/Territory govts., Local govts., Private Landholders	1
	Implement control programs within eradication and buffer zones	Regional BC Steering Committees, Private Landholders, Community groups, Local govt., State/Territory govt. Agencies, Local weed Authorities	1
	Develop and implement an early detection mechanism and implement regular surveys in eradication zones	State/Territory govt. agencies, Local weed authorities	1
	Integrate on-ground actions with existing plans - Landholder property or sub-catchment plans - Local government pest management plans - Strategies for conservation reserves and national parks	State/Territory govt. agencies, Local weed authorities, Regional BC Steering Committees	2
	Facilitate landholder involvement in the catchment, natural resource and local government pest management planning process	Local weed authorities	2
	Develop and resource management plans for government lands consistent with other plans	State/Territory govt. agencies	2
Maximise and coordinate the available resources to eradicate/control bridal creeper to protect high value natural assets	Establish a funding base for control of new outbreaks in eradication zones	State/Territory govts., Local govts.	1
	Provide assistance and resources for maintenance of buffer zones	State/Territory govts., Local govts., landholders	1
Identify risk factors for bridal creeper invasions	Design a risk management program to identify corridors for bridal creeper spread in the landscape	Project Officer, Universities, State/Territory govt. agencies	2

Objective 2.2.5 Contain other, newly emerging asparagus weeds.

Strategy	Actions	Responsibility	Priority
Prevent other Asparagus species naturalised in Australia becoming as widespread and damaging as bridal creeper	Identify and raise awareness of high weed risk *Asparagus* species present in Australia	State/Territory govt. agencies	1
	Declare high weed risk *Asparagus* species under State/Territory Acts to prohibit cultivation, distribution and sale	State/Territory govt. agencies	1
	Establish a system for reporting and eradicating new infestations of these species	State/Territory govt. agencies, Local weed authorities, Community Groups	1
	Develop, fund and implement containment programs	State/Territory govt. agencies, Local weed authorities, Community Groups	1
Establish an early detection system for other related taxa not present in Australia	Identify other potential weedy *Asparagus* species not present in Australia	Australian Quarantine and Inspection Service, Project Officer	3
	Inform state agencies and nursery industry of potential threat	Australian Quarantine and Inspection Service, other Commonwealth agencies, Project Officer	2

2.3 Reduce existing impacts

Desired outcome

Bridal creeper is managed to reduce its density and occurrence.

Background

The greatest information need expressed in the national bridal creeper questionnaire related to best-practice control techniques. Respondents were seeking highly effective techniques which minimised off-target damage, and were quick and relatively cheap to apply. In particular, information was sought on herbicide practices and availability of biological control. These and other control options are available for bridal creeper. The CRC for Weed Management Systems has recently produced a best-bet management guide for bridal creeper, and the national distribution of this guide will increase the expertise and motivation of persons managing the weed.

Natural assets invaded by bridal creeper often have other threats, such as other serious weeds, feral animals and human disturbance. Attention should be given to the total requirements of landscape restoration rather than just weed control. Bridal creeper management should be integrated with other vegetation management activities to avoid new weeds invading an area after it is controlled.

Integrated weed management (IWM), combining such means as biocontrol agents, herbicides, fire and other means, has the potential to provide the most cost-effective long-term control of bridal creeper. There is also still potential to improve the effectiveness of specific control methods. Long-term reserve-scale trials are needed, bringing together researchers and managers to devise successful strategies for widespread adoption. IWM needs to be optimised for both native vegetation and affected primary industries (eg., citrus).

Field observations indicate that the natural spread of the bridal creeper leafhopper and the bridal creeper rust may be slow. Thus it is important to foster community involvement in the rearing and distribution of biocontrols. School involvement in rearing the bridal creeper leafhopper in Western Australia has been very successful, and has also provided an excellent means to raise awareness of the weed and its impacts.

The long-term impacts of the biological control agents released to date (bridal creeper leafhopper and rust) need to be monitored to gauge their effectiveness. Biological control programs against weeds also tend to be more effective in the long-term when a suite of agents are released. Thus, it is wise to pursue agents which attack other stages of the bridal creeper life cycle, such as agents which prevent viable seed formation or consume tubers.

Objective 2.3.1 **Gain land manager adoption of the most effective and appropriate management practices for bridal creeper infestations (including rehabilitation), based on current knowledge.**

Strategy	Actions	Responsibility	Priority
Widespread adoption of current best practice management	Publish and distribute current best practice options for bridal creeper management	CRC for Weed Management Systems	1
	Develop, publicise and implement a training program on best practice for community groups, landholders and reserve managers to control environmental weeds	CSIRO, Universities, State/Territory govt. agencies, Coordinators for community groups, Project Officer	2
	Establish best practice demonstration sites	State/Territory govt. agencies, Local weed authorities, Regional BC Committees, Project Officer	2
	Ensure adequate herbicide registrations for bridal creeper within states so as not to hinder on-ground management, for both native vegetation and affected primary industries	State/Territory govt. agencies, National Registration Authority	1
	Document changes in the health of landscape and ecosystems to measure the success of bridal creeper management	Project Officer, Landholders, Community Groups, Regional BC Committees	2
Gain inter-agency and community group cooperation in extension and control projects across Australia	Develop a readily-accessible database of all stakeholders and their bridal creeper activities at the national, state, regional and local levels	Project Officer, National/State/Regional BC Committees	1
	Hold a national workshop on bridal creeper management, three years after commencement of the strategy's implementation	State/Territory govt. agencies	3
Promote the integration of bridal creeper management	Incorporate bridal creeper management within the context of overall land management in property planning	State/Territory govt. agencies, Landholders, Local weed authorities	2

Objective 2.3.2 Distribute biocontrol agents to regions where eradication of bridal creeper is not technically feasible.

Strategy	Actions	Responsibility	Priority
Ensure the establishment of bridal creeper biocontrol agents throughout the national distribution of bridal creeper	Establish methods to maximise the likelihood of the establishment of the agents	CRC for Weed Management Systems, CSIRO, universities	1
	Involve the community in rearing, release and redistribution of biocontrol agents	CSIRO, State/Territory govt. agencies, Regional BC Committees, Community groups, Schools	1
	Ensure a comprehensive database of release sites and personal contacts is established and maintained	CSIRO, State/Territory govt. agencies	2
Introduce other promising biocontrol agents	Complete host specificity and apply for release of biological control agents currently under study	CSIRO	1
	Examine the potential effectiveness of any other prospective biological control agents	CSIRO	2

Objective 2.3.3 Refine and promote best management practices for bridal creeper infestations where biocontrol agents are established.

Strategy	Actions	Responsibility	Priority
Refine best practice management	Assess the spread and impacts of the bridal creeper rust and bridal creeper leafhopper, to maximise their effectiveness in integrated management	CSIRO, Universities, State and Territory Government Agencies	1
	Maintain a data base of release details from which refinements of release technique can be made	CSIRO	2
	Reassess and refine the best use of herbicides and other control techniques, including fire, in conjunction with biocontrol agents	CSIRO, Universities, State and Territory Government Agencies	2
	Develop an integrated management extension package for affected primary industries (e.g., citrus)	State and Territory Government Agencies, Industry organisations	2
Promote best practice management	Publish and distribute revised best practice options for bridal creeper management in areas with biocontrol agents established, for both native vegetation and affected primary industries	CSIRO, State and Territory Government Agencies	2

3 MONITORING AND EVALUATION

Monitoring

This strategic plan is subject to a five year review. The implementation of the plan will be monitored by the National Bridal Creeper Committee, as a component of its half-yearly meetings and telephone conferences. Annual reports by the National, State and Regional Bridal Creeper Committees will include a review of actions implemented under the Bridal Creeper Strategy and relevant actions under related strategies and plans including:

- State/Territory weed strategies
- local government pest management plans
- catchment and sub-catchment management plans
- landholder property management plans
- strategies for conservation reserves and national parks

Performance indicators

Performance indicators for the plan include:

- Increased awareness of bridal creeper as a weed of national significance in urban and rural communities
- Clear understanding of the current and potential environmental impacts of bridal creeper by landholders, reserve managers, the general community, local weed authorities and governments (Local, State/Territory and Commonwealth)
- Increased delivery of extension material specific to target groups and regions
- Consistent legal restrictions on cultivation, distribution and sale of bridal creeper amongst States/Territories
- Regional and local maps of bridal creeper distribution and density across Australia
- Areas of bridal creeper infestation classified into eradication, buffer and containment zones
- Reductions in the distribution, area and density of bridal creeper infestations in eradication and buffer zones
- Routine monitoring for and control of new bridal creeper infestations in eradication zones
- Increased resources for on-ground actions, including conservation areas and government lands
- Coordinated, strategic on-ground actions on bridal creeper at all levels (e.g., property, local, regional, State/Territory)
- Increased implementation of best management practices, including the use of herbicides and biological controls
- Reductions in the level of risk of spread with reduced level of fruiting by bridal creeper

These will achieve the long-term outcomes of:

- Protection of native vegetation communities and rare or threatened species from the impacts of bridal creeper
- Restored biodiversity in native vegetation communities where bridal creeper has been effectively managed
- Reduced impacts of bridal creeper on primary industries (e.g., citrus, plantation forestry)

4 STAKEHOLDER ROLES AND RESPONSIBILITIES

Private landholders

To control bridal creeper on their own lands, including:

- ability to identify bridal creeper and other weedy *Asparagus* species
- property management plans including bridal creeper
- implementing best practice management for bridal creeper
- eradicating small or strategic infestations

To be aware of the potential for bridal creeper to spread onto their own lands

Community groups (e.g. 'Friends of', bushcare, landcare)

To assist with the strategic control of bridal creeper on a local and regional scale, including:

- representation on Regional Bridal Creeper Committees
- providing control assistance in eradication and buffer zones where this is beyond the ability of individual landholders (private or government)
- implementing best practice management for bridal creeper in high priority natural areas

Local Governments

To ensure environmental impacts of bridal creeper are kept to a minimum in the local government area, including:

- Ensuring that pest management plans include strategic bridal creeper control activities
- Participating in and/or providing assistance to Regional Bridal Creeper Committees
- Liasing with and encouraging local weed authorities, private and government landholders and community groups to undertake strategic bridal creeper control
- Ensuring that strategic bridal creeper control is undertaken on all lands under local government control
- Promoting the participation of all private landholders in strategic bridal creeper control

State/Territory Government Departments of Environment/Natural Resources – WA, SA, VIC, ACT, NSW, TAS and QLD

To ensure environmental impacts of bridal creeper are kept to a minimum throughout the State/Territory by:

- Ensuring that state and regional biodiversity management plans include strategic bridal creeper control activities
- Providing and/or funding awareness, extension and education services for private landholders (including Aboriginal groups), park rangers and other government employee reserve managers, and community groups on the impacts and management of bridal creeper and other weedy Asparagus species
- Contributing to Bridal Creeper Committees at the Regional, State/Territory and National levels
- Prioritising natural assets for protection from bridal creeper
- Providing funding assistance to strategic bridal creeper control programs to protect natural assets from spread of bridal creeper, both on and off government-owned lands
- Implementing and demonstrating best practice management in parks and reserves, including monitoring effects of and integrating biocontrol agents with other control tactics
- Liaising with local weed authorities, private and government landholders and community groups to undertake strategic, coordinated bridal creeper control
- Funding integrated weed management research (including biological control)

Local and State/Territory Weed Control Authorities

To help limit the spread of bridal creeper to new areas by:

- Ensuring that local/State/Territory weed strategies/plans include strategic bridal creeper control activities
- Contributing to Bridal Creeper Committees at the Regional, State/Territory and National levels
- Declaring and enforcing legal restrictions on the cultivation, distribution and sale of bridal creeper
- Providing mapping assistance to Regional Bridal Creeper Committees

- Providing technical and coordination assistance to private and government landholders and community groups undertaking strategic, coordinated bridal creeper control
- Funding integrated weed management research (including biological control)
- Assess the potential threats posed by other weedy Asparagus species and develop plans to deal with such threats

Federal government departments and corporations

- Ensure quarantine controls on entry of *Asparagus* spp.(AQIS)
- To ensure uptake by Departmental staff to restrict movement of weeds (agencies that manage land and travel on non-government land)
- To ensure bridal creeper control is undertaken on all federally managed lands (Defence, Environment Australia and other Commonwealth departments/ corporations that manage land)
- Oversee and manage federal funds including Natural Heritage Trust and National Weed Program (Environment Australia, Agriculture, Forestry and Fisheries – Australia).

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6 ACRONYMS

ACT - Australian Capital Territory
APCC - Animal and Plant Control Commission
AQIS - Australian Quarantine and Inspection Service
BC - bridal creeper
CRC - Cooperative Research Centre
CSIRO - Commonwealth Scientific and Industrial Research Organisation
EA - Environment Australia
NHT - Natural Heritage Trust
NSW - New South Wales
NT - Northern Territory
QLD - Queensland
SA - South Australia
TAS - Tasmania
VIC - Victoria
WA - Western Australia
WONS - weeds of national significance

7 APPENDIX 1

Acknowledgments for the National Bridal Creeper Strategic Plan

The lead organisations for the formation of the national *Bridal Creeper Strategic Plan* were the Animal and Plant Control Commission (South Australia) and the CRC for Weed Management Systems.
Collators - Dr John Virtue, A. Prof. Rick Roush and Mr Paul Jupp

Organisations and individuals that participated in the development of the draft strategy included:

- Agriculture Western Australia
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- Animal and Plant Control Commission/Boards, SA
  Dr John Virtue, Mr David Cooke, Mr Paul Jupp, Mr Peter Sheridan, Mr Martin Weidenbach
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- Dept. of Natural Resources and Environment
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- Dept. of Natural Resources, QLD
  Mr Craig Walton
- Dept. of Primary Industries, Water and Environment, TAS
  Mr Stephen Welsh
- Dr Kelly Raymond (formerly of Monash University, Victoria)
- NSW Agriculture
  Dr John Hosking, Mr Bob Trounce
- NSW NPWS
  Dr Andrew Leys
- National Trust South Australia
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Eighty-seven replies were received in response to the national bridal creeper questionnaire, from national park managers, friends and bushcare groups, noxious weed officers and local government environment officers. This provided valuable information on current distribution, information needs for management of bridal creeper and strategic future actions. The collators are very grateful for the "on-ground" perspective given by the survey respondents.

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